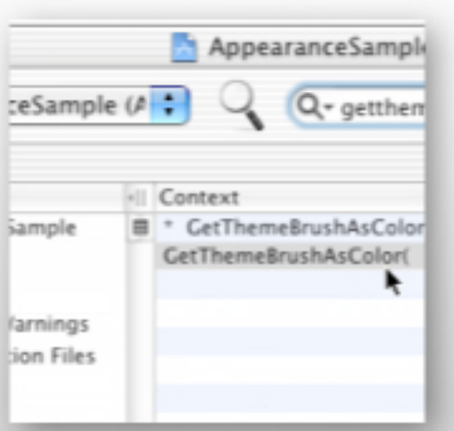
Data Interchange for Professional Applications

Session 004



Developer Opportunities With Apple's Professional Applications

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It’s All About workflow…

Data Interchange for Professional Applications

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Introduction

A discussion of data format and interchange strategies

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A discussion of data format and interchange strategies

- Methods and formats for exchanging data
- Leveraging data interchange to extend and enhance applications
- Extending and enhancing Apples' professional applications

What You'll Learn

- Exchanging project data with other applications
- Sharing media with other applications
- Enhancing/linking applications with custom tools and plugins

Exchanging Project Data

Exchanging Project Data

What is project data?

- The structure that ties media elements together
- The data that users spend most of their time creating
- Traditionally difficult to exchange beyond the basics

Exchanging Project Data

Legacy Data Exchange Formats

- Designed 15–20 years ago
- Oriented towards hardware based, tape to tape production systems

Exchanging Project Data

Legacy Data Exchange Formats: Batch Lists

- Designed to drive tape-based acquisition systems
- Defines individual clips/segments by indexed locations on source tape (timecode)
- Stored as simple, delimited text files
- Easily viewable and editable by users
- Relatively easy to parse and generate

Exchanging Project Data

Legacy Data Exchange Formats: Batch Lists

Name	Duration	Media Start	Media End	Reel
Clip1	00:10:00;00	01:00:00;00	01:09:59;29	001
Clip2	00:10:00;00	01:20:00;00	01:19:59;29	001
Clip3	00:10:00;00	01:35:00;00	01:44:59;29	001

Exchanging Project Data

Legacy Data Exchange Formats: EDLs

- EDL = Edit Decision List
- Designed for tape-based switcher systems (online systems)
- Supports basic time-based edits and effects using an event model.
- Limited to 2 tracks of video and 4 tracks of audio
- Viewable and editable by users
- Non-trivial to parse and generate

Exchanging Project Data

Legacy Data Exchange Formats: EDLs

```
TITLE: SEQUENCE 1
FCM: DROP FRAME

001  001      V     C        01:03:03:00 01:05:02:02 01:00:00:00 01:01:59:00
001  002      V     D    060 02:03:54:07 02:05:54:24 01:01:59:00 01:03:59:17
* EFFECT NAME: CROSS DISSOLVE
* FROM CLIP NAME:  CLIP1
* COMMENT:
* TO CLIP NAME:  CLIP2

002  001      AA    C        01:03:03:00 01:05:03:02 01:00:00:00 01:02:00:02
* FROM CLIP NAME:  CLIP1
* COMMENT:

003  002      AA    C        02:03:55:07 02:05:55:09 01:02:00:02 01:04:00:04
* FROM CLIP NAME:  CLIP2
* COMMENT:

004  002      V     C        02:05:54:24 02:05:54:24 01:03:59:17 01:03:59:17
004  003      V     W012 030 03:04:00:01 03:06:00:18 01:03:59:17 01:06:00:06
* EFFECT NAME: CROSS IRIS
* FROM CLIP NAME:  CLIP2
* COMMENT:
* TO CLIP NAME:  CLIP3

005  003      AA    C        03:04:00:16 03:06:00:18 01:04:00:04 01:06:00:06
* FROM CLIP NAME:  CLIP3
* COMMENT:
```

Exchanging Project Data

Contemporary Data Exchange Formats

- Created to replace legacy formats
- Designed to address capabilities of modern systems
- Based around proprietary binary container formats
- Not directly viewable or editable by users
- Complicated to parse and generate

Exchanging Project Data

Contemporary Data Exchange Formats: OMF

- Created by AVID as a common file format for their video and audio editing products
- Based around OpenDoc/Bento container format
- Allows for composition only (project) and media+composition (project and media) storage
- Essentially abandoned as of today
- Primarily used for audio production with ProTools

Exchanging Project Data

Contemporary Data Exchange Formats: AAF

- Created by an industry consortium as a replacement for OMF
- Based on Microsoft Structured Storage container format
- Intended as a universal media/project exchange format
- Mix of public (documented) and private (black) data
- Supported by AVID, Quantel, etc… and soon Apple (courtesy of Automatic Duck)

Exchanging Project Data

Open Data Exchange Formats

- Created to replace legacy formats and address shortcomings of contemporary formats
- Open access to ALL data, both in storage and structure
- Can be designed to be easy to parse and generate
- Platform/library requirements minimized

Exchanging Project Data

Open Data Exchange Formats: XML Interchange Format

- Introduced with Final Cut Pro 4
- Uses XML as the storage format
- Easy to parse and generate using standard tools
- Viewable and editable by users
- Designed to be a superset of other formats
- Complete contents documented (no black data allowed)
- Does not address embedded media transport

Exchanging Project Data

Open Data Exchange Formats: XML Interchange Format

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE xmeml>
<xmeml version="0.5">
     <clip id="Clip1">
          <name>Clip1</name>
          <duration>17982</duration>
          <rate>
               <ntsc>TRUE</ntsc>
               <timebase>30</timebase>
          </rate>
          <in>5484</in>
          <out>9082</out>
          <timecode>
               <string>01:00:00;00</string>
               <frame>107892</frame>
               <format>DF</format>
               <source>source</source>
               <reel>
                    <reelname>001</reelname>
               </reel>
          </timecode>
     </clip>
</xmeml>
```

Demo

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http://developer.apple.com/wwdc2003/urls.html

Exchanging Project Data

Open Data Exchange Formats: XML Interchange Format

- When will be be available?
  - Public beta downloadable from the WWDC website
    - Early development build with preliminary documentation
    - We want your feedback!
  - Used as the data transport for a forthcoming plugin API
  - Final release to developers and end users later this year

Exchanging Project Data

Open Data Exchange Formats: Other Formats?

- AAF has formed a working group to investigate an XML representation of AAF
- Becoming more popular among newer applications for native file formats

Exchanging Project Data

Strategies for data exchange

- Even limited data interchange is extremely useful
- Support conventional/legacy formats only if relevant
- Encourage the use and development of open data formats and translation tools

Exchanging Project Data

Data exchange with Apples' professional applications

- Final Cut Pro 4
  - Native support for EDLs, Batch Lists, and XML
  - OMF and AAF through Automatic Duck plugins
- Shake 3
  - Plain-text project file format

Exchanging Media

Exchanging Media

Why exchange media with other applications?

- Access media in non-native formats
- Leverage tools and capabilities in other applications
- Output content to devices/formats not supported by your application
- Increase the value of your application in a production environment

Exchanging Media

Traditional difficulties in sharing media

- Lack of public formats (storage) and codecs (encoding)
- Loss of quality during conversion
- Licensing issues with proprietary formats

Exchanging Media

Common video/image formats

- GIF, TIFF, JPEG, PICT
- Image Sequences
- QuickTime
- AVI, WMV
- OMF, AAF
- Cineon/DPX
- MPEG-2 (element streams)

Exchanging Media

Common audio formats

- AIFF, WAV
- SD2
- QuickTime
- AVI, WMA
- OMF, AAF
- MP3, AC3

Exchanging Media

Common combined (muxed) formats

- QuickTime
- AVI, WMA/WMV
- OMF, AAF
- MXF
- MPEG-2 (transport and program streams)

Exchanging Media

Metadata

- Ancillary data, related to the attached media
  - Timecode, Source Tape ID, etc…
- Traditionally stored in strange locations
- Required in most production environments
- Becoming more important in the context of modern workflow systems and production pipelines

Exchanging Media

Strategies for media interchange

- Support as many common formats as possible
  - Rich media engines (e.g., QuickTime) can help
- Import/process media as close to the native format/resolution as possible
  - YUV, 16-bit images, 24-bit audio, etc…
- Access or pass-through metadata if at all possible

Exchanging Media

Media interchange with Apples' professional applications

- QuickTime as a universal container format
  - New, open uncompressed codecs introduced in FCP 4
  - Support for metadata (timecode, etc…)
- 24-bit, 96khz audio support in FCP 4
  - Multichannel support through CoreAudio

Developing Custom Tools

Developing Custom Tools

Example: Building a media/project archive

- Allows for the collection, tracking, and archiving (backup) of all the assets for a production
  - Track revisions of elements
  - Review/approval loop
  - Central location for status and backups
- Primes infrastructure for multi-user workflows

Developing Custom Tools

Example: Linking specialized applications

- By combining specialized tools, individuals with different skill sets can contribute to the same project/product
- Different tools can be used at different stages of the production process
  - Low-end machines used for rough (offline) tasks
  - High-end systems for finishing (online) tasks

Demo

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http://developer.apple.com/wwdc2003/urls.html

Developing Custom Tools

Example: Integrating into a production pipeline

- Automated (or semi-automated) processing of elements
  - Project files need to be easily generated
  - Media should have no (or minimal) loss of quality as it moves through the an application
  - The more scriptable it is, the easier an application is to integrate
  - The process needs to be quantifiable and reproduceable

Summary

Pulling it all together

Summary

Pulling it all together

- Project data interchange
  - Import/Export gives the maximum flexibility for the best tools to be used at the appropriate time
  - The ability to move data increases the chance for someone to try a new application

Summary

Pulling it all together

- Media interchange
  - Allowing for multiple tools to be combined by the customer to achieve the desired result
  - Combine the unique capabilities of your application with others

Summary

Pulling it all together

- Extensibility and scriptability
  - Integrating custom tools makes a product more useful to organizations who need specialized capabilities
  - Scripting allows power users to enhance an application quickly

Summary

Development strategies

- Application developers
  - Support and/or provide open project and media formats
  - Provide at least basic extensibility (plugins, scriptability)
- Tool developers
  - Leverage open data formats to hook into data flow
  - Integrated tools are very compelling to end users

Summary

Apples' professional application direction

- Open project data interchange formats
- High quality media exchange using QuickTime
- Application extensibility through plugins and other mechanisms
- We want your feedback

Wrap Up

Roadmap

006 Extending Professional Applications with Plugins	The Marina Friday, 3:30pm

Who to Contact

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http://developer.apple.com/wwdc2003/urls.html

Q&A

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WWDC 2003

Worldwide Developers Conference